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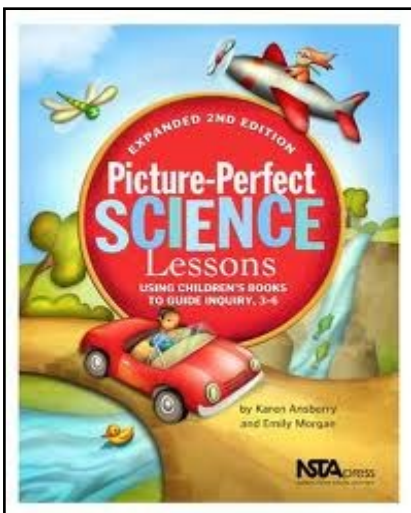
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NGSS UPDATE: Achieve has indicated that the second and final public draft of the Next Generation Science Standards (NGSS) is scheduled for release the first week of January. The NGSS staff made this decision so that all stakeholders, educator and the public would have full access to the draft and an appropriate amount of time to review this important document. All persons are encouraged to provide feedback on the NGSS draft. You will find articles in this edition of *Science News* that could prove to be beneficial in preparing for a review of the final draft.

Science – Everyone, Everyday!

The title says it all. If you were one of the inquiry-minded professionals who attended the National Science Teachers Association (NSTA) Conference in Louisville, you walked away with a greater awareness of current research in the area of science education, innovations and products to use in your classroom. The Louisville NSTA Conference was focused on three strands: Science Across the Curriculum; Putting STEMs to Work; and Creativity and Problem Solving with Science. There was a wealth of information shared in all three of these strands that certainly made the trip downtown worthwhile.

For those of you who were not able to attend, here are two bits of valuable science materials from the NSTA sessions .



First, Karen Ansberry and Emily Morgan, authors of *Picture Perfect Science*, held a workshop that provided participants with fresh ideas as to how to “fit it all in” by integrating science content and reading in meaningful ways. Both shared numerous books and the related lessons that align with the current science standards. If you have not seen their work, you are missing out on a treasure chest of instructional activities that can be used to guide inquiry lessons.

One of the activities from *Picture-Perfect Science* that was shared with the group dealt with the impact of human activity on the environment. Ansberry and Morgan shared the books *Turtle Bay* and *Turtle, Turtle Watch Out*. They incorporated reading strategies during the read-aloud portion of the lesson (from questioning to synthesizing), then engaged the participants in a turtle survival game that required the identification of natural and human events that prove to be harmful or helpful to the turtles.

This was just one of the many lessons that tied science content with reading. Several more lessons are included in *Picture-Perfect Science* lessons. The literacy connections made to science are relevant and timely as we continue to foster cross-domain instruction.

You might want to check out the new books *More Picture-Perfect Science Lessons* and *Using Children's Books to Guide Inquiry, K-4*. These materials can be very useful as you connect science across the curriculum.

Another session worth noting was that of Christine Cunningham, founder and author of *Engineering is Elementary* (EiE). The “Engineering-Enhanced Science, Inquiry and Problem Solving” session provided the participants with suggested ideas regarding materials that are available to teachers as they focus on including science and engineering practices in daily instruction. Cunningham shared information on her program

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as well as how to engage students in authentic experiences that incorporate engineering design principles and practices. Cunningham's enthusiasm for sharing her passion for engineering with teachers who can then impact student learning in their classroom was contagious. EiE is currently being implemented in several Louisville schools through the Department of Engineering at the University of Louisville. Contact [Gary Rivoli](#) for further information on how the program is impacting student learning through STEM education or to learn about available EiE trainers in your area of Kentucky. More information can be found on the EiE site <http://www.mos.org/eie/dex.php>.



UofL EiE information: <http://louisville.edu/speed/damentaoutreach.html>

What is Happening in Your Neck of the Woods?



Who knows better what works in the classroom than those who are directly impacting student learning and achievement? Teacher contributions are welcome and will be included in the *Science Newsletter*. We invite you to send in ideas, strategies, resources and lesson ideas to share with your peers across the state. Let us hear from you. E-mail your contributions to christine.duke@education.ky.gov. We look forward to learning more about best practices in science through your valuable experiences and insight.

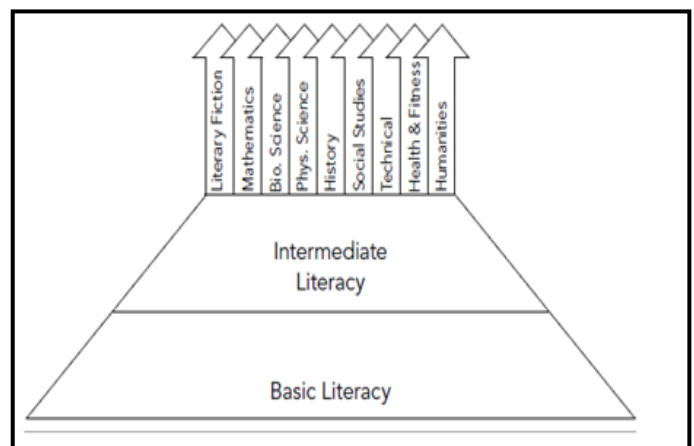
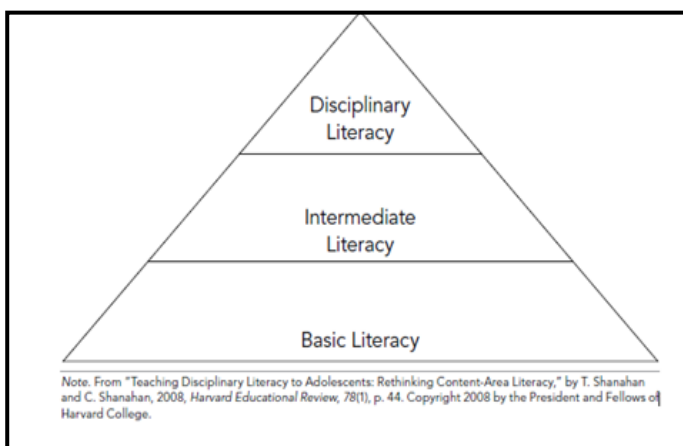
Science Connection: Literacy

An Introduction to *Developing Readers in the Academic Disciplines* (Doug Buehl)

Article submitted by Cindy Parker, KDE Literacy Coordinator

How is reading in biological science, or in physical science, different from reading literary fiction or history? How can discipline-specific teachers mentor students as readers, writers and thinkers in their classes? In his latest book, *Developing Readers in the Academic Disciplines*, Doug Buehl tackles these questions and more. Teachers in any content area will find this an enlightening and useful read because it will impact the way in which content is planned and delivered to meet learners' needs.

Each of the seven chapters of the book addresses more than general reading strategies; it provides teachers with a rationale and examples of how to use content area-specific strategies to support student learning. To establish how and why this is needed, Buehl illustrates the challenges students face when learning in different academic contexts. In primary grades, students are taught basic literacy; then, they progress to intermediate (many continue to need help in developing and refining these skills beyond the intermediate grades). Disciplinary literacy is the next phase, which can be further broken down into the discrete subjects students encounter.



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Developing Readers in the Academic Disciplines (Cont. from Page 2)

Helping students negotiate through science texts poses unique challenges. While students may “bring some topic knowledge of the physical and biological worlds,” science texts “tend to focus predominantly on domain knowledge, particularly the discourse and factual details of science” (p. 98). To assist teachers in assisting their students, Buehl provides a “Self-Questioning Taxonomy” for biological and physical science. These charts include Bloom’s taxonomy, comprehension self-assessment questions and focusing questions, all specific to the discipline. Below is the chart for biological science.

Self-Questioning Taxonomy for Biological Science Texts		
Level of Thinking	Comprehension Self-Assessment	Focusing Question
Creating	I have created new knowledge about the biological world.	How has this author changed what I understand? How has this author corrected previous misconceptions?
Evaluating	I can critically examine this author’s conclusions/theories/explanations	What conclusions/theories/explanations does the author provide? How do we know? What is the evidence? What other conclusions/theories/explanations could be justified by the evidence?
Analyzing	I can understand why.	What happened? Why did it happen? How did it happen? How does this {biological concept} “work”? Why does this {biological concept} “work” the way it does? What are the defining characteristics? How is this similar to (or different from) other related biological concepts?
Applying	I can use my understanding to better understand the biological world.	How can I connect my experiences to what this author is telling me? How can I use what this author is telling me to better understand living things? How is what the author is telling me different from what I previously understood?
Understanding	I can understand what the author is telling me about the biological world.	What does this author want me to understand about living things? How does the visual information help me understand what the author is telling me? What do I currently understand about what the author is telling me?
Remembering	I can recall specific information and ideas from this text.	What biological concepts do I need to remember for future understandings? What biological vocabulary do I need to become comfortable using?

Buehl, D. (2009) Read Like An Insider. The Exchange: IRA Secondary Reading Interest Group, Vol 22, No. 1, 2-5.

Each chapter contains the latest research on disciplinary literacy and is full of helpful sample tools, organizers, guides and other information, specific to each subject that will aid student learning. Chapter one is available online, and the book is now available as an e-book.

NGSS: The Final Draft

As we continue to see evidence of the changing seasons, frost appearing on the windows and firewood being stacked as folks ready for the cold to set in, so do teachers across the nation continue to wait anxiously for the chance to view the changes made to the Next Generation Science Standards (NGSS) in the second and final public release document. This is a very exciting time for teachers across all the content areas who welcome the development of the new science standards that support 21st-century learning. The NGSS represent a revolutionary shift in the way science has been taught for nearly two decades. New research has provided insight into best practices in science education and which core concepts are relevant for all students to understand in order to become science-literate citizens.

Soon educators will have an opportunity to view and provide valuable feedback on the second draft of the NGSS. It is important that all teachers (science, math and English /language arts) charged with the implementation of the new standards take the time to read the upcoming draft as well the foundational work on which it was developed. The *Framework for K-12 Science Education* is available at http://www7.nationalacademies.org/bose/Standards_Framework_homepage.html.

When viewing the upcoming draft, you will see that the architecture of the standards has specific components that address the key scientific ideas and practices outlined in the *Framework*. Briefly, each standard is broken down into an assessable performance expectations that combine three dimensions of learning. These dimensions — Crosscutting Concepts, the Disciplinary Core Concepts and the Science and Engineering Practices — are combined in each performance expectation to address what each student should master by the end of the 12th grade. Also, there is a connection box for each performance expectation where you will see references to other content areas that relate to the specific standard. More detailed information about the NGSS is available at www.nextgeneration.org. Here you can learn about rationale for the new standards and the history of the development of NGSS as well as gather more information about each component of the document architecture.

For those planning to review the NGSS document, the National Science Teachers Association (NSTA) has provided a useful guide in its October addition of *Science and Children* (October 2012). =January can be an ideal time to don a comfy wool sweater, indulge in a warm cup of cocoa and delve into the upcoming NGSS release draft. This will be your opportunity to participate in the shaping of this important document. Keep watching the Kentucky Department of Education website or those mentioned previously for the release date and an further information regarding the NGSS.

Suggestions for Reviewing and Providing Input to the Next Public Draft of the Next Generation Science Standards

Adapted from the Massachusetts Department of Education

Reviewing the NGSS can be an overwhelming task, particularly if you do not have a significant amount of time to do so. This document provides suggestions that may be helpful to streamline your review of the standards. Individuals may review only a portion of the standards, but collectively, many people across the state will have contributed to the review of the entire document.

In your review we encourage you to:

- remember that standards are an articulation of desired student outcomes; standards are *not* an articulation of curriculum or instructional methodology
- comment on both specific standards (performance expectations) and broad design features or assumptions

I. Choose a focus.

The NGSS is fairly lengthy and may be too much for one individual to review the entire set in the time available. Below are three suggestions for reviewing a subset of the NGSS document. You may want to review the survey questions (see III. below) and the broad design features or assumptions prior to doing your review.

Review the K-12 progression of standards through a particular core idea or topic.

For instance, review all the standards associated with the core idea *Physical Science 1: Matter and its Interactions*, through all grades. This would include any standard aligned to PS1.A: Structure and Properties of Matter; PS1.B: Chemical Reactions; and PS1.C: Nuclear Processes in all grade levels. Alternatively, follow the progression of the topic *Interdependent Relationships in Ecosystems* (IRE). This would include all in that topic through the grade spans.

Review the full set of standards (all disciplines) at a particular grade or grade span.

For instance, if you teach 5th-grade science, you might review all the 5th-grade topics: 5.SPM; 5.MEOE; 5.ESP; 5.SS. *We recommend that you also review the same topics in grades 3 and 4 to understand and consider the progression of learning that leads to the grade 5 standards.*

Review a particular discipline (LS, ESS, PS) at a grade span you are knowledgeable about.

For instance, if you are a 6-8 teacher, you might begin by looking at the 6-8 Life Science topics, including Structure and Properties of Matter, Chemical Reactions, Forces and Motion, Interactions and Forces, Energy, and Waves and Electromagnetic Radiation. *Please review the similar topics for grades 3-5 to understand and consider the progression of learning that leads to the 6-8 standards.*

II. Collaborate and discuss with others (if possible)

Everyone benefits from discussion their thoughts and reactions with others. If you review the NGSS individually, we encourage you to discuss your review with others. As you engage with your colleagues, please discuss both specific standards (performance expectations) and broad design features or assumptions.

The National Science Teachers Association provides one example of how group discussion of the draft NGSS might be facilitated through a suggested protocol for study groups:

www.nsta.org/about/standardsupdate/resources/HowToConductAStudyGroupOnNGSS.pdf

III. Provide input via the NGSS survey.

Go to www.nextgenscience.org to access the survey. Detailed instructions for accessing, completing and submitting the survey will be available there. Please look for the sections of the survey that correspond to the sections you have reviewed. Also look for sections that ask for input on the overall NGSS or broader design features. Each section will have open comment boxes to include your thoughts not solicited in the specific questions. The survey will allow you to indicate whether you are responding as an individual or a group.



The Science Spotlight is on Kathryn Winn Elementary School

Kathryn Winn Elementary School (Carroll County) students have been actively engaged in science instruction, both in the classroom and in the field, literally. From gardening and recycling to excursions to a local stream, budding scientists are making connections to the real world on a daily basis. Students extend classroom learning by visiting their Outdoor Classroom located a few miles from the school. Kathryn Winn leases the property from Dow Corning. Here, students explore the stream environment for ecosystems and living inhabitants. All 500 students visit to extend classroom learning in science.



(photos submitted by Gail Becraft)
Kathryn Winn Elementary students explore the ecosystem during their outdoor classroom.

Gail Becraft, primary science teacher at Kathryn Winn, began coordinating this yearly visit seven years ago. All students rotate through stations at the outdoor classroom area, such as hiking to explore a temperate forest with old growth, tree planting, pumpkin planting and observing the states of matter. "This is a cooperative effort between community volunteers and agencies that pitch in and provide supplies and manpower to create one of the most fantastic days of our school year," notes Becraft. As of the spring of 2012, the classroom teachers are visiting more frequently on a smaller scale, so it has become more valuable than ever as a learning site for small groups.



Other connections between science and the real world include composting, community gardening and lessons that involve "school grown" plants and the animals that inhabit the school gardens. Just look at what was once a parking lot — it is now the garden area at Kathryn Winn. The construction of the garden area required a lot of thought, planning and hard work on the students' part. Gravel had to be removed to make room for the raised beds and worm bins. After removing the gravel, mulch was transported, and in a caravan of red wagons and buckets, soil was moved across the campus. Shine on, Kathryn Winn Elementary School. Thank you for sharing all the wonderful opportunities that you are providing for your students and for making science lessons a hands-on-experience.

Conference Information & Professional Development

KSTA Mid-Winter BREAKTHROUGH 2012

**Green River Regional Educational Cooperative
Bowling Green**

**Everyday Engineering for Everyday Educators (E4)
STEM, Technology, GIS
Hands-on Lessons in Engineering, K-12
Science Literacy — Reading and Writing
Balanced Assessment Approaches in STEM**

The KSTA Mid-Winter Break will take place on February 15 and 16, 2013, at the Green River Regional Educational Cooperative in Bowling Green. The two day mini-conference will focus on the Next Generation Science Standards with an emphasis on the Science and Engineering Practices as well as other opportunities to improve teaching and learning in the science classroom. All science teachers K through 12 are invited to join and apply to present.

For more information, please contact brian.womack@grrec.ky.gov or visit www.ksta.org.

Teacher Resources



<http://www.agclassroom.org/index.cfm>

Have you visited the Teacher Center of the U.S. Department of Agriculture's website? You will discover a wealth of information and teaching materials relevant to your instruction with a definite connection to real-world learning. You will also find professional development opportunities, outreach activities, student resources and games, lesson plans and related STEM programs. Agriculture in the

Classroom (AITC) also has a National Resource Directory, an online searchable database that lists hundreds of educational resources designed to help educators locate high-quality classroom materials and information.

One STEM resource is titled Science in Your Shopping Cart. This resource, complete with Common Core-aligned plans, introduces the high-tech aspects of agricultural production and explores the related careers. Just think of the usefulness of such resources as teachers provided plans for lessons that provide opportunities for students to make connections between their learning the content and readying for college or a career. Lessons like this and many others located in the National Resource Directory will assist you and your students in the development of their Individual Learning Plans.

Science News is produced by the Kentucky Department of Education's Division of Program Standards. For information about any of the items featured in this issue, please contact [Christine Duke](#) or [Sean Elkins](#) at (502) 564-2106.

